

## CLAIMS

1. A working fluid injection apparatus for a fluid dynamic pressure bearing, the apparatus being used for injecting a working fluid into a gap between a housing and a shaft in a bearing unit that is constituted by the housing having an opening portion and the shaft held in the housing with its end exposed from the opening portion, comprising:

a cover member, which is arranged, in a contact state, on an upper surface of the housing, in which a ring-shape open portion for the gap in the opening portion is arranged upward, and which forms, above the open portion, a reservoir portion capable of storing the working fluid with the reservoir portion communicated with the open portion;

a chamber that sealably holds the bearing unit onto which the cover member is mounted;

a valve device that opens/closes an internal space of the chamber with respect to an external space thereof;

an exhaust device that exhausts air in the internal space of the chamber to obtain a decompressed state; and

a dispenser that drops the working fluid onto the reservoir portion in the chamber in the decompressed state.

2. The working fluid injection apparatus for a fluid dynamic pressure bearing according to claim 1, wherein:

the shaft is arranged such that its end is protruded outward from the opening portion of the housing; and

the reservoir portion is formed to have a ring shape between the outer peripheral surface of the protruded shaft and the cover member.

3. The working fluid injection apparatus for a fluid dynamic pressure bearing according to claim 1 or 2, wherein the cover member is provided with a lower opening larger than the open portion and a tapered inner surface that gradually expands upward from the lower opening.

4. The working fluid injection apparatus for a fluid dynamic pressure bearing according to claim 3, wherein a taper angle of the tapered inner surface is  $45^{\circ}$  to  $75^{\circ}$ , more preferably,  $55^{\circ}$  to  $65^{\circ}$ , even more preferably  $60^{\circ}$  with respect to a central axis line.

5. The working fluid injection apparatus for a fluid dynamic pressure bearing according to any one of claims 1 to 5, further comprising a reservoir for storing the working fluid to be supplied to the dispenser,

wherein the inside of the reservoir is put in a decompressed state.

6. The working fluid injection apparatus for a fluid dynamic pressure bearing according to any one of claims 1 to 5, further comprising a controller that controls an intake air flow such that the pressure in the chamber is gradually raised from a decompressed state to an atmospheric pressure state for 10 to 50 seconds, preferably 20 to 40 seconds, more preferably 25 to 35 seconds.

7. A working fluid injection method for a fluid dynamic pressure bearing, the method being used for injecting a working fluid into a gap between a housing and a shaft in a bearing unit that is constituted by the housing having an opening portion and the shaft held in the housing with its end exposed from the opening portion, comprising the steps of:

- arranging upwardly a ring-shape open portion for the gap in the opening portion;

- arranging a cover member, in a contact state, on an upper surface of the housing, the cover member forming a reservoir portion capable of storing the working fluid above the open portion with the reservoir portion communicated with the open portion;

- decompressing the bearing unit to exhaust air in the gap;

- dropping and storing the working fluid in the reservoir portion under a decompressed atmosphere after the exhaust of the air in the gap; and

releasing the decompressed state in the bearing unit in the state in which the working fluid is stored.

8. The working fluid injection method for a fluid dynamic pressure bearing according to claim 7, wherein the step of releasing the decompressed state is performed gradually for 10 to 50 seconds, more preferably 20 to 40 seconds, even more preferably 25 to 35 seconds.

9. The working fluid injection method for a fluid dynamic pressure bearing according to claim 7 or 8, wherein in the step of dropping and storing the working fluid, the working fluid the volume of which is larger than the total volume of the gap is stored.

10. A method of manufacturing a fluid dynamic pressure bearing, comprising:

inserting a shaft into a gap formed in a housing to structure a bearing unit in which an end of the shaft is exposed from an opening portion of the housing;

arranging upwardly a ring-shape open portion for the gap formed between the opening portion of the housing and the shaft exposed from the opening portion;

mounting a cover member, in a contact state, on an upper surface of the housing, the cover member forming, above the

open portion, a reservoir portion capable of storing a working fluid with the reservoir portion communicated with the open portion;

decompressing the bearing unit to exhaust air in the gap;

after the exhaust of the air, dropping and storing the working fluid onto the reservoir portion under a decompressed atmosphere; and

releasing the decompressed state in the bearing unit in the state in which the working fluid is stored.

11. The method of manufacturing a fluid dynamic pressure bearing according to claim 10, wherein the release of the decompressed state is performed gradually for 10 to 50 seconds, preferably 20 to 40 seconds, more preferably 25 to 35 seconds.

12. The method of manufacturing a fluid dynamic pressure bearing according to claim 10 or 11, wherein the working fluid the volume of which is larger than the total volume of the gap is stored between the introducing tool and the shaft.